

POVILAS SNARSKIS' COLLECTION OF THE POACEAE SPECIMENS, NEWLY DISCOVERED IN THE HERBARIUM OF VILNIUS UNIVERSITY

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Abstract

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We newly found a collection of the Poaceae specimens deposited at the Herbarium of Vilnius University (WI), collected by Povilas Snarskis mainly from eastern Lithuania in 1943–1960. The collection consisted of 67 herbarium sheets representing 28 species, including endangered species *Glyceria lithuanica*. The collection provided new data on abnormal growth forms of common Lithuanian grasses and the distribution of rare and endangered Poaceae species in eastern and southern Lithuania. The discovered *Glyceria lithuanica* specimen is the oldest of all known records of the species in Lithuania.

Keywords: abnormal growth forms, commelinids, *Glyceria lithuanica*, *Koeleria*, Vilnius Region.

INTRODUCTION

The Commelinidae family Poaceae (R. Br.) Bernhart (Gramineae Juss.) comprises up to 12.000 species worldwide (KELLOGG, 2015; SORENG et al., 2017), with more than 110 species native to Lithuania (GUDŽINSKAS, 1999). The Poaceae, the fifth most species-rich family of flowering plants, is viewed as a natural model system with highly repetitive morphology elements (VORONTSOVA et al., 2015). The taxonomy of the Poaceae species includes many ambiguities, and specimen identification requires dedication. The flowers of grasses are anemophilous and aggregated into spikelets, which then form terminal racemose or paniculate inflorescences. The features of glumes, florets (lemmas and paleas), and lodicules are highly diverse and used by taxonomists to describe and classify grasses (NATKEVIČAITĖ-IVANAUSKIENĖ, 1963; CLAYTON et al., 2006). Herbarium collections of the Poaceae species make current taxonomic work possible, and worldwide, there are 5.605.757 preserved specimen records entered to the Global Biodiversity

Information Facility (GBIF, 2020). The total number of the Poaceae specimens in Lithuanian herbaria is unknown.

Traditionally, herbaria collections are viewed as pivotal for studies of taxonomy and provide baseline data on diversity (NATKEVIČAITĖ-IVANAUSKIENĖ, 1994; BEBBER et al., 2010). The biological collections of academic institutions have made countless contributions to science from environmental monitoring to traditional taxonomy and systematics and are increasingly being recognised as a unique and underused resource (BERENDSOHN & SELTMANN, 2010; FUNK, 2014; JAMES et al., 2018). It is not uncommon for botanists to leave incompletely identified herbarium specimens that are later forgotten. The ongoing, worldwide, large-scale digitisation projects for increasing accessibility to biodiversity data enhances the pace of herbaria analyses with new species being described each year from specimens that have been housed in collections for decades (SOLTIS et al., 2018).

In 2016, when the Herbarium of Vilnius University (WI) was moved to a new modern depository

at the Life Sciences Centre, a long-lost Bryophyte collection was analysed (JUKONIENĖ et al., 2018; RASIMAVIČIUS, 2018). At the same time, a stack of 61 herbarium sheets lacking fully identified specimens of grasses collected by Povilas Snarskis in 1943–1960 was discovered. Professor P. Snarskis (1889–1969) was an insightful researcher of Lithuanian flora, taxonomist and plant geographer (TUPČIAUSKAITĖ & RIMGAILĖ-VOICIK, 2020). This study aimed to identify the discovered collection of P. Snarskis, and provide new knowledge about the morphological variation of the Poaceae species included in this collection, and present their current distribution in Lithuania.

MATERIALS AND METHODS

The specimens were identified using previously published information (NATKEVIČAITĖ-IVANAUSKIENĖ, 1963, 1980; TZVELEV, 1974, 2000; VOVK, 1977; CONERT, 1998; GUDŽINSKAS & SINKEVIČIENĖ, 2002; SINKEVIČIENĖ, 2003; ROTHMALER et al., 2005; GOREMYKINA, 2013). Where appropriate, the nomenclature follows GUDŽINSKAS (1999), and interspecies taxa were identified according to CONERT (1998) and NATKEVIČAITĖ-IVANAUSKIENĖ (1980). To categorise the rarity or abundance of the species and general characteristics, such as size and occurrence frequency, we followed KUUSK et al. (2003).

Diagnostic features were checked using an Olympus SZXZ stereo microscope and an Olympus CH40 microscope. Leaf thin sections for *Koeleria* Pers. specimens were cut by hand in the middle of the leaf and analysed using an Olympus SZ61 stereo microscope. To facilitate additional comparisons among *Koeleria* specimens, two other *Koeleria* herbarium specimens were sectioned and viewed using a microscope, *K. delavignei* Czern. ex Domin and *K. pyramidata* (Lam.) P. Beauv. Detailed images were captured with a Pixelink camera.

After identifying the specimens, we compiled a descriptive list with the herbarium label information from P. Snarskis and notes made by the authors of this paper (Appendix 1). We presented the genera and species in alphabetical order. The specimens of *Koeleria glauca* (Spreng.) DC., which had highly variable leaf sections, were marked in the notes of the appendix with a question mark (?), indicating a level of uncertainty.

RESULTS

General characteristics of the Poaceae collection

The original collection consisted of 61 herbarium sheets. The specimens were not mounted on paper, and some herbarium sheets contained several dried specimens. Almost all collection labels were written in ink and corresponded to the handwriting of P. Snarskis (Fig. 1B). Five labels were not written by P. Snarskis, but one of these five labels was signed by him (Fig. 1A). On the labels of two unidentified specimens (Appendix 1; No. 4, No. 43) and one separate sheet of paper (Appendix 1; No. 9), P. Snarskis left pencil notes indicating specific specimen characters or a plausible taxon. The specimens were analysed attentively by the collector so that the characters needed for identification would be better visible in dried material: some specimen leaf ligules were highlighted before drying, and one *Agrostis* L. specimen had the number of lemmas accentuated.

Based on the data presented in the herbarium labels, the largest part of the collection (89%) was plants collected from eastern Lithuania, mainly from Vilnius Region. The specimens had been collected over 12 years, with varying levels of collection intensity. Specifically, the specimens were collected in 1943, 1946, 1948–1953, 1955–1956, 1958, and 1960.

Twenty-eight localities were mentioned in the herbarium labels (Appendix 1). The largest number of specimens was collected near the Vilnius–Daugavpils railway (31%). Twenty-eight percent of the specimens were collected in Vilnius and within a radius of 20 kilometres from the city (28%), with several other specimens collected in Druskininkai (15%) and Palanga (10%). Other localities were also along the railway lines of Vilnius–Kaunas (6.5%), Vilnius–Varėna (5%), Radviliškis–Daugavpils (3%), and Kaunas–Kybartai (1.5%). Plants were collected near train stops or up to a few kilometres away from the train line.

The habitats described on the labels fall into these major categories: forests (mainly pine forests; 61% of herbarium sheets), meadows (18%), secondary habitats (railroad embankments, roadsides, and near cultivated fields; 11%), and bogs and riversides (10%).

Analysis of collection diversity

After examination, the number of herbarium sheets increased from 61 to 67, because two differ-



Fig. 1. Atypical Poaceae specimens collected by P. Snarskis: not fully identified (A) and unidentified specimens (B)

ent species were found placed together in six herbarium sheets (Table 1). Only one specimen, *Koeleria gracilis* Pers., in the analysed collection was identified to species level by P. Snarskis. In 47 herbarium sheets, P. Snarskis identified the plants to level of genus: *Koeleria* (23), *Agrostis* (10), *Calamagrostis* Adans. (four), *Poa* L. (three), *Alopecurus* L. (two), *Bromus* L. (two), *Festuca* L. (two), and *Lolium* L. (one). In 13 herbarium sheets, specimens were left unidentified.

After analysing the collection, the number of the collected genera increased from eight to 17 (Table 1). Additional genera were: *Anisantha* K. Koch, *Bromopsis* (Dumort.) Fourr., *Catabrosa* P. Beauv., *Corynephorus* P. Beauv., *Glyceria* R. Br., *Milium* L., *Molinia* Schrank, *Phleum* L., and *Trisetum* Pers. The genus *Anisantha* was included in the list because of a nomenclature change (SCHOLZ, 2008); the collection was correctly identified by P. Snarskis and treated as *Bromus*.

A total of 28 species were determined in the collection: *Agrostis canina* L., *A. capillaris* L., *A. ×murbekii* Fouill., *A. stolonifera* L., *A. vinealis* Schreb., *Alopecurus pratensis* L., *Anisantha tectorum* (L.) Nevski, *Bromopsis erecta* (Huds.) Fourr., *Bromus arvensis* L., *B. hordaceus* L., *Calamagrostis arundinacea* (L.) Roth, *C. canescens* (F.H. Wigg.) Roth, *C. stricta* (Timm) Koeler, *Catabrosa aquatica* (L.) P. Beauv., *Corynephorus canescens* (L.) P. Beauv., *Festuca ovina* L. var. *firmulacea* (Markgr.-Dannenb.) Stohr, *Festuca polesica* Zapał., *Glyceria lithuanica* (Gorski) Gorski, *Koeleria glauca* (Spreng.) DC., *K. grandis* Besser ex Gorski, *Lolium temulentum* L., *Milium effusum* L., *Molinia caerulea* (L.) Moench, *Phleum phleoides* (L.) H. Karst., *Poa annua* L., *P. palustris* L., *P. trivialis* L., and *Trisetum sibiricum* Rupr. The highest number of species was attributed to *Agrostis*, *Calamagrostis*, and *Poa* (Table 1). Two *Koeleria* specimens were determined to genus level.

More than a third of P. Snarskis collection con-

Table 1. The summary of species and herbarium sheet numbers before and after the analysis of P. Snarskis collection

Genera	Before identification		After identification	
	Species	Herbarium sheets	Species	Herbarium sheets and their previous history
<i>Agrostis</i>	N/A	10	5	9 + 3 (unidentified) + 1 (mixed in a sheet with other species)
<i>Alopecurus</i>	N/A	2	1	2
<i>Anisantha</i> *	N/A	N/A	1	1 (other genus)
<i>Bromopsis</i> **	N/A	N/A	1	1 (unidentified)
<i>Bromus</i>	N/A	2	2	1 + 1 (unidentified)
<i>Calamagrostis</i>	N/A	4	3	4 + 1 (unidentified) + 1 (other genus) + 1 (mixed in a sheet with other species)
<i>Catabrosa</i> **	N/A	N/A	1	2 (unidentified)
<i>Corynephorus</i> **	N/A	N/A	1	1 (unidentified)
<i>Festuca</i>	N/A	2	2	2
<i>Glyceria</i> **	N/A	N/A	1	1 (unidentified)
<i>Koeleria</i>	1	23	2	24 + 2 (mixed in a sheet with other species)
<i>Lolium</i>	N/A	1	1	1
<i>Milium</i> **	N/A	N/A	1	1 (unidentified)
<i>Molinia</i> **	N/A	N/A	1	1 (mixed in a sheet with another genus)
<i>Phleum</i> **	N/A	N/A	1	1 (unidentified)
<i>Poa</i>	N/A	3	3	3 + 1 (mixed in a sheet with other genus)
<i>Trisetum</i> **	N/A	N/A	1	1 (unidentified)

Symbols: * – new genus because of nomenclature change; ** – new genus after identification.

sisted of rare or uncommon species in Lithuania. Specifically, the collection contained: *Agrostis vinealis*, *Bromopsis erecta*, *Bromus arvensis*, *Calamagrostis stricta*, *Catabrosa aquatica*, *Festuca polesica*, *Glyceria lithuanica*, *Koeleria grandis*, *Lolium temulentum*, *Phleum phleoides* and *Trisetum sibiricum*.

Atypical growth forms

The largest part of the collection highlights the Poaceae specimens with morphological features not typical to the given taxon in size, colour or atypical growth form (Fig. 1). *Bromus hordaceus*, *Catabrosa aquatica* (Appendix 1; No. 28), *Milium effusum* and *Poa annua* were taller than average or almost at the maximum of known height. *Calamagrostis arundinacea*, *Koeleria glauca* (Appendix 1; No. 35) and *Phleum phleoides* (Fig. 1B) were shorter than average. The specimens of unusual colour were divided into two categories: 1) previously described as intraspecific taxa (Appendix 1; No. 3, 4, 29); 2) caused by extreme growth conditions such as solar radiation (Appendix 1; No. 13, 20, 35, 41, 42, 53, etc.). Other unusual morphological features included *Poa palustris* with a branched stem, *Catabrosa aquatica* with remote lower panicle branches (Appendix 1; No. 28), and *Koeleria glauca* with elliptical panicles with

elongated middle branches of the inflorescence (Appendix 1; No. 35) or an extended underground stem (Appendix 1; No. 34).

Among *Calamagrostis canescens* specimens, variation was also noticeable, mostly related to glume exterior features. The *Calamagrostis* specimens (Appendix 1; No. 21–24) collected represent the spectrum of *C. canescens* species. One of the specimens with unopened greenish panicles was provisionally identified by P. Snarskis as *Agrostis* (Appendix 1; No. 21).

An unusual specimen of *Agrostis* (Appendix 1; No. 9) was reclassified to *A. ×murbeckii* Fouill. (*A. capillaris* × *A. stolonifera*). In the present territory of Lithuania, this hybrid was published as *Agrostis ×lithuanica* Besser ap. Roem. et Schult., and three known localities were reported (NATKEVIČAITĖ-IVANAUSKIENĖ, 1963). P. Snarskis collected an unusual specimen of *Agrostis* (specimen No. 9) seven years earlier than the available data on this hybrid in present day Lithuania. The *A. capillaris* × *A. stolonifera* hybrid is known to be common in flooding sites (TZVELEV, 1974; CONERT, 1998) and is rather common in the Baltic countries (KRALL et al., 2003a). The ligule in specimen No. 7 (Appendix 1) was 2 mm in length, triangular, panicle rachises clustered; under-

ground horizontal stolon was 4 cm in length, with the tip broken off. Visually it was similar to specimen No. 9 and might be a hybrid (*A. capillaris* × *A. stolonifera*).

There were evident discrepancies in the hairiness, stem base thickenings, and lemmas shape of specimens identified as *Koeleria glauca*. Two specimens of *Koeleria* had highly complicated sets of traits (Appendix 1; No. 47, 48; Fig. 2, E) and were identified to the genus level. Specimen No. 48 had features similar to *Koeleria glauca* (vegetative shoots had more than four leaves; thickenings at the base of the stem were small, but present; lemma tips rounded), but other features (densely tufted, shoots curved like a bow; 1 cm long broken rhizome was present; leaves on the vegetative shoot up to 12 cm in length, partly curled) were more typical of *Koeleria grandis*. Because the features present in the specimen were not assigned to a species, the specimen was determined to the genus level.

The leaf cross-sections of *K. glauca*, *K. grandis*, *K. delavignei* and *K. pyramidata* were compared. The results of these comparisons suggested that the

leaf cross-sections of *K. glauca* in P. Snarskis' collection had a wider morphological variation than is given in the description of the *K. glauca* leaf section (CONERT, 1998). Otherwise, leaf cross-sections representing different species are easily distinguished and can be used to determine *Koeleria* species (Fig. 2).

DISCUSSION

P. Snarskis' collection of the Poaceae species probably remained unidentified for three main reasons: 1) the tumultuous history of that period in Lithuania; 2) the possibility of some species being unknown in Lithuania; 3) the abnormal morphological features. First, during the interwar period, Lithuania was isolated from the south-eastern part of the country (Fig. 3). Until the autumn of 1939, Vilnius Region was a part of Poland, and Lithuania and Poland were officially at war for Vilnius between 1920 and 1938 (SNYDER, 2003). In 1940, the decision was made to move the Faculty of Mathematics and Natural Sciences from the temporary capital Kaunas to Vilnius and re-establish Vilnius University (KLIMAVIČIŪTĖ, 2002). After 1939, Vilnius Region, with its unique geomorphological conditions and habitats of north-eastern and south-eastern sandy plains (BASALYKAS, 1965), became available for research.

Second, it is possible that some species were un-

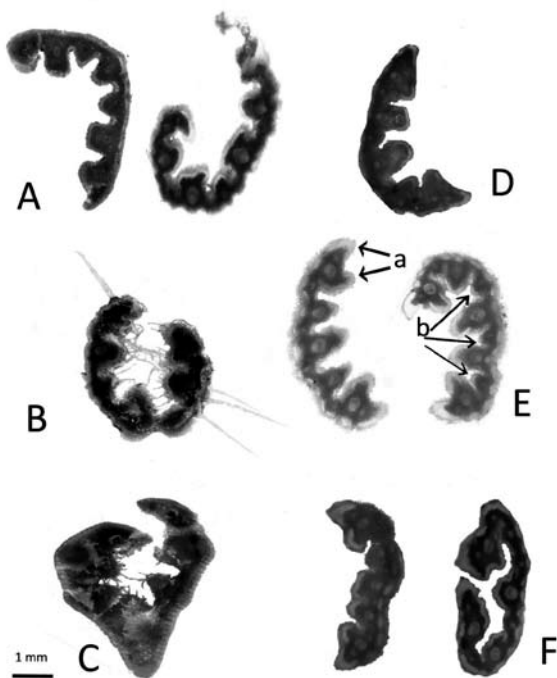


Fig. 2. Thin leaf cross-sections of *Koeleria* specimens: A – *K. pyramidata*; B – *K. grandis*; C – *K. delavignei*; D – *K. glauca*; E and F – atypical *K. glauca* (in E arrows mark atypical ridges at the leaf edges (a) and in the central part of the leaf (b))

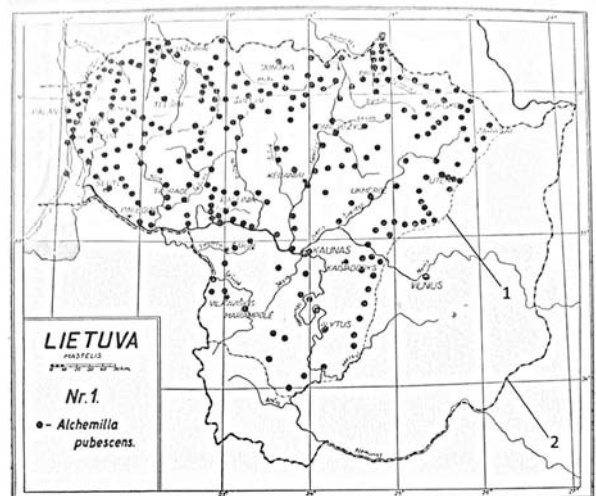


Fig. 3. Distribution map of *Alchemilla pubescens* in Lithuania (SNARSKIS, 1939), illustrating the territory of Lithuania researched by P. Snarskis until 1939: 1 – Lithuanian state borderline with Poland (1922–1939); 2 – the border of eastern Lithuania, recognised by the Soviet Russia–Lithuania Peace Treaty (1920), and reclaiming ethnic Lithuanian lands

known at the time of collection or their prevalence in Lithuania was very limited. This may have caused P. Snarskis to set aside the specimens for further investigation. One of the most critical findings in this Poaceae collection was a new and the oldest location record of *Glyceria lithuanica* in Lithuania, collected by P. Snarskis in 1960, near Pagiriai Railway Station, Kaišiadorys district. *Glyceria lithuanica* is distributed only in the south-eastern and north-eastern parts of Lithuania; it was thought that it was first discovered in Biržai district in 1984 (GUDŽINSKAS & SINKEVIČIENĖ, 2002). The specimen collected by P. Snarskis in 1960 is the oldest known record, and it was collected in central Lithuania, slightly to the west of previously known collections. At present, *G. lithuanica* is a rare protected species in Lithuania (ANONYMOUS, 2020).

Koeleria grandis, *Trisetum sibiricum* have limited distribution in eastern Lithuania, and *Bromopsis erecta* has limited prevalence in southern Lithuania. *Agrostis vinealis* and *Catabrosa aquatica* form endangered communities in south-eastern Lithuania (BALEVIČIENĖ, 2000; SINKEVIČIENĖ, 2000). After comparison with the published distribution maps (NATKEVIČAITĖ-IVANAUSKIENĖ, 1980; GUDŽINSKAS, 2007a,b), we can conclude that this discovered Poaceae collection by P. Snarskis provided data on new localities of *Bromopsis erecta*, *Festuca ovina* var. *firmulacea*, *Festuca polesica*, *Glyceria lithuanica* and *Koeleria grandis* (Appendix 1; No. 52).

Third, in some cases, complexes of the features of *Koeleria* specimens did not completely resemble a particular taxon. The taxonomy of *Koeleria* has long been recognised to be problematic because of the genera's remarkable morphological plasticity and similarity among taxa (WATSON & DALLWITZ, 1992; ARNOW, 1994; BRULLO et al., 2009), which might be a result of polyploidisation (PEČINKA et al., 2006; DIXON, 2001b) and hybridisation. Specimen No. 48 was determined by P. Snarskis as *Koeleria gracilis* (accepted name *K. macrantha* (Ledeb.) Schult.). A previously published study (NATKEVIČAITĖ-IVANAUSKIENĖ, 1963) mentioned that *K. macrantha* was discovered by P. Snarskis in Matuizos village in 1958; however, a later work by the same author (NATKEVIČAITĖ-IVANAUSKIENĖ, 1980) revisited the specimen (WI, No. P02207) and the occurrence of the species in Lithuania was rejected. The specimen identified as *K. mac-*

rantha (Appendix 1, No. 48) and the previously known specimen (WI, P02207) were collected from the same locality on the same date. The disagreement on the status of the species remains: according to different authors, the species does (LEKAVIČIUS, 1989; GUDŽINSKAS, 1999) or does not (KRALL et al., 2003b) occur in Lithuania. Unfortunately, after analysing this specimen, we were not able to confirm the existence of *K. macrantha* in Lithuania. Future fieldwork must be conducted to determine whether this species is present in Lithuania.

Thin leaf sections were prepared to further investigate atypical specimens of *Koeleria glauca*. In *Koeleria* species, the configuration of sclerenchyma and chlorenchyma layers and the size of vascular bundles and leaf ridges found in leaf cross-sections (Fig. 2) are thought to be a character of taxonomical value (VOVK, 1977; CONERT, 1998; GOREMYKINA, 2013). It is possible that the variation in leaf anatomy occurred as a reaction to different environmental conditions and, therefore, represents different ecotypes. Alternatively, the variation may have occurred due to hybridisation between *K. grandis* and *K. glauca*.

The analysis of P. Snarskis collection highlighted the importance of herbarium collections and increased the understanding of high-value specimens held in a section of the herbarium lacking categorisation. It is possible that insufficient funding for herbarium-related research has delayed other important discoveries in Lithuanian botany. The analysis of P. Snarskis collection provided additional insights into the distribution of rare and endangered Poaceae species in Lithuania. Our exploratory morphological analysis of *Koeleria* specimens increased the understanding of the complex genus and provided new insight for future research.

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AUTHOR CONTRIBUTIONS

The specimens were identified by J. Tupčiauskaitė. J. Tupčiauskaitė and R. Rimgailė-Voicik wrote the manuscript and analysed the leaf sections of *Koe-*

leria. The specimens were discovered, photographed, and deposited by M. Rasimavičius.

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VILNIAUS UNIVERSITETO HERBARIUME NAUJAI ATRASTA POVILO SNARSKIO POACEAE ŠEIMOS AUGALŲ KOLEKCIJA

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Santrauka

Straipsnyje analizuojamas Vilniaus universiteto herbariume (WI) rastas P. Snarskio Poaceae šeimos augalų rinkinys, surinktas daugiausia Rytų Lietuvoje 1943–1960 metais. Iš viso 67 herbariuminiuose lapuose buvo identifikuoti 28 rūšių Poaceae šeimos augalai, tarp kurių ir saugoma *Glyceria lithuani-*

ca rūšis. Kolekcijoje rastas *G. lithuanica* pavyzdys yra pirmas žinomas šios rūšies konstatavimo faktas Lietuvoje. Kolekcija papildo žinias apie netipiškas dažnų Poaceae šeimos rūšių morfologines formas bei retų ir saugomų rūšių paplitimą Rytų ir Pietryčių Lietuvoje.

APPENDIX 1. THE LIST OF SPECIMENS IDENTIFIED IN P. SNARSKIS' COLLECTION WITH LABEL DATA AND NOTES

- Agrostis canina* L.; dried swamp, Druskininkai, 25 August 1946
P. Snarskis det.: *Agrostis*, label not handwritten by Snarskis, but signed by him.
Note: individual with dense leaf tufts on nodes (Fig. 1, A); almost no flowers remaining.
- A. canina* L., raised bog, near a lake, Verkiai, Vilnius county, 26 June 1948
P. Snarskis det.: *Agrostis*.
- A. canina* L., raised bog, near a lake, Verkiai, Vilnius county, 26 June 1948
P. Snarskis det.: *Agrostis*.
Note: plant colour unusual. Panicle bright yellowish; represents var. *varians*, currently not accepted (CONERT, 1998).
- A. canina* L., wet meadow, Švenčionys, 1 July 1951
P. Snarskis det.: *Agrostis*; with pencil faintly written "*canina*".
Note: identification problematic: no upper lemma present, rhizome dense. Specimen represents var. *varians* with intermixed features of var. *mutica* and var. *pubida*; currently not accepted (CONERT, 1998).
- A. canina* L., drained meadow, Palanga, 5 July 1958
P. Snarskis det.: *Agrostis*.
- A. capillaris* L., sandy open forest site, Valakampiai, Vilnius, 16 June 1943
Note: in a sheet with *A. vinealis*.
- A. capillaris* L., pine forest, Verkiai, Vilnius county, 26 June 1948
Note: identification problematic; potential hybrid (*A. capillaris* × *A. stolonifera*).
- A. capillaris* L., swampy site, Nemenčinė, 28 June 1952
P. Snarskis det.: *Agrostis*.
- A. ×murbeckii* Fouill., a meadow near a lake, Papiškės village, Vilnius district, 21 July 1956
P. Snarskis det.: *Agrostis*; on separate sheet written in pencil: "leaves not rounded, flat";
Note: identification problematic: the middle veins of glumes scabrous in the upper part, but ligules short, 1–2 mm long, triangular with blunt tip, panicle rachises toothed and stolons partly aboveground; potential hybrid (*A. capillaris* × *A. stolonifera*).
- A. stolonifera* L., meadow, Druskininkai, 20 August 1946
P. Snarskis det.: *Agrostis*; label not handwritten by Snarskis.
Note: on glumes, lemmas, and the bases of spikelets dark threadlike *Cladosporium* Link hyphae (det. Dr J. Rukšėnienė) present.

11. *A. stolonifera* L., meadow, Matuizos Railway Station, 25 June 1958
P. Snarskis det.: *Agrostis*.
12. *A. vinealis* Schreb., sandy open forest site, Valakupiai, Vilnius, 16 June 1943
13. *A. vinealis* Schreb., dry pine forest, Palanga, 8 August 1949
Notes: label not handwritten by Snarskis; panicles brightly red.
14. *Alopecurus pratensis* L., swampy meadow, Palanga, 4 July 1958
P. Snarskis det.: *Alopecurus*.
15. *A. pratensis* L., meadow, Pagiriai Railway Station, Kaišiadorys district, 22 June 1960
P. Snarskis det.: *Alopecurus*; railway station name not clearly written.
16. *Anisantha tectorum* (L.) Nevski, on the railway embankment, Druskininkai, 16 July 1950
P. Snarskis det.: *Bromus*.
17. *Bromopsis erecta* (Huds.) Fourr., abandoned soil near the railway, Matuizos village, Varėna district, 24 June 1958
18. *Bromus arvensis* L., barren site, Druskininkai, 16 July 1950
P. Snarskis det.: *Bromus*; habitat written not clearly.
19. *B. hordaceus* L., by the field, Druskininkai, 28 July 1950
Note: plant unusually high (92 cm); stem broken into four pieces.
20. *Calamagrostis arundinacea* (L.) Roth, on the lake slope, Degučiai village, 12 July 1955
P. Snarskis det.: *Calamagrostis*.
Note: plant unusually short (55 cm); leaves and stems brown; panicles yellowish, not fully opened.
21. *C. canescens* (F.H. Wigg.) Roth, swamp near the railway station, Lentvaris, 13 May 1948
P. Snarskis det.: *Agrostis*.
Note: specimens with unopened greenish panicles.
22. *C. canescens* (F.H. Wigg.) Roth, forest, Vilkaiviškis, 1 July 1952
P. Snarskis det.: *Calamagrostis*.
23. *C. canescens* (F.H. Wigg.) Roth, meadow, Obeliai, west of the railway station, 28 June 1958
P. Snarskis det.: *Calamagrostis*.
24. *C. canescens* (F.H. Wigg.) Roth, forest, Pagiriai Railway Station, Kaišiadorys district, 22 June 1960
P. Snarskis det.: *Calamagrostis*.
25. *C. stricta* (Timm) Koeler, swampy meadow, Verkiai, Vilnius county, 26 June 1948
26. *C. stricta* (Timm) Koeler, meadow, Obeliai, west of the railway station, 28 June 1958
P. Snarskis det.: *Calamagrostis*.
Note: only panicle with upper stem collected; in a sheet with *C. canescens*.
27. *Catabrosa aquatica* (L.) P. Beauv., wet meadow, Druskininkai, 20 August 1946
Note: label not handwritten by P. Snarskis.
28. *C. aquatica* (L.) P. Beauv., on the bank of Vilnelė River, Markučiai, Vilnius, 18 June 1948
Note: exceptionally large individual; 55 cm tall; lower panicle branches with 5 cm gap from the rest of panicle.
29. *Corynephorus canescens* (L.) P. Beauv., dry sandy abandoned field, Palanga, 8 August 1949
Note: label not handwritten by Snarskis; colour not typical, panicle light green, represents features of var. *flavescens*; currently not accepted (CONERT, 1998).
30. *Festuca ovina* L. var. *firmulacea* (Markgr.-Dannenb.) Stohr, pine forest, Rūkainiai, Vilnius district, 6 July 1960
P. Snarskis det.: *Festuca*.
31. *F. polesica* Zapał., Pine forest, Druskininkai, 7 June 1960
P. Snarskis det.: *Festuca*.
32. *Glyceria lithuanica* (Gorski) Gorski, forest, Pagiriai railway station, Kaišiadorys district, 3 July 1960
33. *Koeleria glauca* (Spreng.) DC., pine forest, Švenčionėliai, 26 June 1951
P. Snarskis det.: *Koeleria*.
Note: reddish-brown colour short (9–28 cm) plants with tight panicle (0.5 cm in diameter). Stem bases distinctly thickened.
34. *K. glauca* (Spreng.) DC., pine forest, Pabradė, 30 June 1951
P. Snarskis det.: *Koeleria*.
Note: (?) underground part too long, tenuous, thickenings indistinct.
35. *K. glauca* (Spreng.) DC., pine forest, Kaltanėnai, near Kaltanėnai-Švenčionys road, 2 July 1951
P. Snarskis det.: *Koeleria*.

- Note: (?) Fig. 2, F; stems short (4–17 cm); panicles elliptical: long (5–10 cm) and wide (1.5–3 cm) with elongated branches in the middle; leaves brown. Trampling effect on *Koeleria* morphology (DIXON, 2001a).
36. *K. glauca* (Spreng.) DC., dry pine forest, Dobis, Vilnius county, 2 July 1951
P. Snarskis det.: *Koeleria*.
Note: plants too dark reddish brown; thickenings of the lower part indistinct.
37. *K. glauca* (Spreng.) DC., pine forest, Druskininkai, 6 August 1951
P. Snarskis det.: *Koeleria*.
Note?: plants too dark greyish brown; thickenings of the lower part indistinct.
38. *K. glauca* (Spreng.) DC., pine forest, Nemenčinė, 11 June 1953
P. Snarskis det.: *Koeleria*.
Note: reddish-brown colour, too dark; collected unusually – separately (six separate stems); lower stem part thickening large.
39. *K. glauca* (Spreng.) DC., pine forest, Nemenčinė, 11 June 1953
P. Snarskis det.: *Koeleria*.
40. *K. glauca* (Spreng.) DC., dry pine forest, Santaka village, 1 July 1955
P. Snarskis det.: *Koeleria*.
Note: panicles and stems greyish-yellow, lower leaves reddish-brown.
41. *K. glauca* (Spreng.) DC., dry pine forest, Santaka village, 1 July 1955
P. Snarskis det.: *Koeleria*.
Note: dark, reddish brown, large.
42. *K. glauca* (Spreng.) DC., dry pine forest, Santaka village, 1 July 1955
P. Snarskis det.: *Koeleria*.
Note: (?) dark, reddish brown.
43. *K. glauca* (Spreng.) DC., pine forest, Kryžiskis village, Vilnius district, 8 July 1956
P. Snarskis det.: *Koeleria*; “cris” written faintly in pencil.
Note: vegetative shoots have more than four leaves; thickenings at the base of the stem small, but present. Represents f. *glabriculumis*; currently not accepted (CONERT, 1998) Fig. 2, D.
44. *K. glauca* (Spreng.) DC., dry pine forest, approximately 6 km north of Dūkštas, 11 July 1956
P. Snarskis det.: *Koeleria*.
Note: single stem.
45. *K. glauca* (Spreng.) DC., pine forest, south of Žeimenė Railway Station, 16 July 1956
Note: leaf section atypical.
46. *K. glauca* (Spreng.) DC., pine forest near the station, Pažeimenė Railway Station, 17 July 1956
P. Snarskis det.: *Koeleria*.
Note: (?) stems and panicles reddish-brown, too small.
47. *Koeleria* Pers., pine forest, approximately 3 km south of Pažeimenė Railway Station, 17 July 1956
P. Snarskis det.: *Koeleria*.
Note: (?) at first glance as *K. glauca*, but too many shoots at the base of the stem. Leaf section extremely atypical; Fig. 2, E, on the right.
48. *Koeleria* Pers., pine forest, Matuizos Railway Station, 25 July 1958
P. Snarskis det.: *Koeleria gracilis* Pers.
Note: (?) at first glance as *K. glauca*; features discussed in the text; extremely atypical, Fig. 2, E, on the left.
49. *K. grandis* Besser ex Gorski, pine forest, Pabradė, 30 June 1951
P. Snarskis det.: *Koeleria*.
50. *K. grandis* Besser ex Gorski, pine forest, Švenčionėliai, 1 July 1951
P. Snarskis det.: *Koeleria*.
51. *K. grandis* Besser ex Gorski, forest, Kaltanėnai, 2 July 1951
P. Snarskis det.: *Koeleria*.
Note: rhizome intensively branched, vegetative shoots exceed generative.
52. *K. grandis* Besser ex Gorski, pine forest, Lavariškės Village, July 1952
P. Snarskis det.: *Koeleria*.
53. *K. grandis* Besser ex Gorski, pine forest, Nemenčinė, 11 June 1953
P. Snarskis det.: *Koeleria*.
Note: too dark, reddish-brown, too small, especially panicles; found in the same sheet with *K. glauca*.
54. *K. grandis* Besser ex Gorski, pine forest, Nemenčinė, Vilnius district, 11 June 1953
P. Snarskis det.: *Koeleria*.
Note: found in the same sheet with *K. glauca*.
55. *K. grandis* Besser ex Gorski, pine forest, approximately 8 km north of Dūkštas, 11 July 1956

- P. Snarskis det.: *Koeleria*.
56. *K. grandis* Besser ex Gorski, dry pine forest, approximately 3 km south of Pasmalvė Railway Station, Zarasai district, 11 July 1956
P. Snarskis det.: *Koeleria*.
57. *K. grandis* Besser ex Gorski, pine forest, approximately 3 km south of Pažeimenė Railway Station, 17 July 1956
P. Snarskis det.: *Koeleria*.
58. *K. grandis* Besser ex Gorski, dry pine forest, approximately 6 km south of Pažeimenė Railway Station, 17 July 1956
P. Snarskis det.: *Koeleria*.
59. *Lolium temulentum* L., wheat field, Lavariškės village, 20 July 1952
P. Snarskis det.: *Lolium*.
60. *Milium effusum* L., forest, Pagiriai Railway Station, Kaišiadorys district, 21 May 1960
Note: extremely large; 90 cm tall, leaves 2 cm wide.
61. *Molinia caerulea* (L.) Moench, Park, Palanga, 14 August 1952
P. Snarskis det.: *Poa*.
Note: in a sheet with *Poa trivialis*; at first glance similar, from a recreational area.
62. *Phleum phleoides* (L.) H. Karst., Park meadow, Palanga, 14 August 1952
Note: stem too short, 24 cm in length, curved (Fig. 1, B); from a recreational area.
63. *Poa annua* L., near the street, Antakalnis, Vilnius, 29 August 1951
P. Snarskis det.: *Poa*.
Note: exceptionally large individual, approximately 30 shoots, 25 cm in height.
64. *P. palustris* L., forest, Druskininkai, 16 July 1950
P. Snarskis det.: *Poa*.
Note: stem branched at the base with two generative stems (50 cm in length); the main stem broken off (remaining 20 cm).
65. *P. trivialis* L., on the railway embankment, Druskininkai, 16 July 1950
P. Snarskis det.: *Bromus*.
Note: small plant, found in the same sheet with *Anisantha tectorum*.
66. *P. trivialis* L., Park, Palanga, 14 August 1952
P. Snarskis det.: *Poa*.
67. *Trisetum sibiricum* Rupr., forest opening, Riešė, Vilnius district, 28 June 1960
Note: single broken generative stem.